Corticosteroid injections for the treatment of hand and wrist disorders in general practice

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Summary

The main objective of this thesis was to investigate effectiveness of local corticosteroid injections provided by general practitioners for the specific hand and wrist disorders carpal tunnel syndrome (CTS), trigger finger and de Quervain's tenosynovitis. This was realized by conducting two systematic reviews of effectiveness of steroid injections for trigger finger and de Quervain's tenosynovitis (a systematic review of effectiveness of local steroid injections for carpal tunnel syndrome was already published previously) and by designing three randomized controlled trials (RCT's) in general practice that compared efficacy of steroid injections to injections with placebo for CTS, trigger finger and de Quervain's tenosynovitis. Finally, a validation study investigated psychometric properties of the Dutch Boston Carpal Tunnel Questionnaire, which was translated by us into Dutch for use in the RCT of efficacy of steroid injections for CTS.

Chapter 1, the introduction to this thesis, provides a brief description of aetiology, pathophysiology and risk factors for CTS, trigger finger and de Quervain's tenosynovitis. Also the taxonomy, epidemiology and predictors of severity of hand and wrist disorders in general and specifically of CTS, trigger finger and de Quervain's tenosynovitis are discussed. Thereafter an overview of treatment options, effectiveness of interventions and possible complications of treatment with local steroid injections for these disorders are given. Finally the objectives of this thesis are stated.

A systematic review of effectiveness of corticosteroid injections for trigger finger in adults is presented in **Chapter 2**. The main objective of the review was to summarize the evidence on the efficacy and safety of corticosteroid injections for trigger finger in adults. For this purpose the electronic bibliographic databases CENTRAL, DARE, MEDLINE (1966 to November 2007), EMBASE (1956 to November 2007), CINAHL (1982 to November 2007), AMED (1985 to November 2007) and PEDro (a physiotherapy evidence database) were searched. We selected randomized and controlled clinical trials evaluating efficacy and safety of corticosteroid injections for trigger finger in adults. The databases were searched for titles of eligible studies. After screening abstracts of these studies, full text articles of studies which fulfilled the selection criteria were obtained. Data were extracted using a predefined electronic form. The methodological quality of included trials was assessed by using items from the checklist developed by Jadad and the Delphi list. We planned to extract data regarding information on the primary outcome measures: treatment success, frequency of triggering or locking, and functional impairment of fingers, severity of the trigger finger. Secondary outcome measures were proportion of patients with side effects, types of side effects, and patient satisfaction with injection. Only two small randomized controlled trials of poor methodological quality were found that involved 63 participants: 34 were allocated to corticosteroids and lidocaine, and 29 were allocated to lidocaine alone. Both studies showed better short-term effects of corticosteroid injection combined with lidocaine compared to lidocaine alone on the treatment success outcome. Corticosteroid injection with lidocaine was more effective than lidocaine alone on treatment success at four weeks (relative risk 3.15, 95% CI 1.34 to 7.40). The number needed to treat to benefit was 3. In one study the effects of

corticosteroid injections lasted up to four months. No adverse events or side effects were reported. Thus, the available evidence for the effectiveness of intra-tendon sheath corticosteroid injection for trigger finger can be graded as a silver level evidence for superiority of corticosteroid injections combined with lidocaine over injections with lidocaine alone, according to the grading system proposed by Tugwell.

Chapter 3 contains the second systematic review, which concerns corticosteroid injections for de Quervain's tenosynovitis. The main objective was to summarize evidence on the efficacy and safety of corticosteroid injections for de Quervain's tenosynovitis. The electronic bibliographic databases CENTRAL, DARE, MEDLINE (1966-april 2009), EMBASE (1956- april 2009), CINAHL (1982- april 2009), AMED (1985- april 2009), Dissertation Abstracts and PEDro (physiotherapy evidence database) were searched. Randomized and controlled clinical trials evaluating efficacy and safety of corticosteroid injections for de Quervain's tenosynovitis were selected. Databases were searched for titles of eligible studies. After screening abstracts of these studies full text articles of studies which fulfilled the selection criteria were obtained. Data were extracted using a predefined electronic form. The methodological quality of included trials was assessed by using the checklist developed by Jadad and the Delphi list. Data were extracted regarding information on the primary outcome measures treatment success, severity of pain or tenderness at the radial styloid, functional impairment of the wrist or hand, outcome of Finkelstein's test and the secondary outcome measures proportion of patients with side-effects, type of side-effects and patient satisfaction with injection treatment. Only one small controlled clinical study of poor methodological quality was found, including 18 participants, comparing one steroid injection with methylprednisolone combined with bupivacaine to splinting with a thumb spica. All patients in the steroid injection group (9/9) achieved complete relief of pain and none of the patients in the thumb spica group (0/9) had complete relief of pain one to six days after intervention (NNT: 1, 95% CI 0.8 to 1.2). No side effects or local complications of steroid injection were noted. The level of evidence for superiority of steroid injections over thumb spica splinting could therefore be graded as silver, according to the grading system proposed by Tugwell. However, the applicability of these findings for daily clinical practice seems limited since only one study could be included in the review with only 18 participants, the methodological quality of the included study was poor and only pregnant and lactating women participated in the study.

In **Chapter 4** the results of the first RCT of efficacy of steroid injections for carpal tunnel syndrome in general practice are reported. The objective was to determine if corticosteroid injections for carpal tunnel syndrome provided by general practitioners are effective. In this study 69 participants with a clinical diagnosis of carpal tunnel syndrome were recruited from 20 general practices. Short-term outcomes (two weeks after injection treatment) were assessed in a randomized, placebo-controlled trial. Long-term outcomes were assessed in a prospective cohort-study of steroid responders during the follow-up period of 12 months. Participants were randomized to local injections of 1 ml triamcinolonacetonide 10 mg/ml (TCA) or 1 ml NaCl (placebo). Participants who had been treated with NaCl and who had no treatment response at short term assessment were treated with 1 or 2 additional open TCA injections. Main outcomes were immediate treatment success, mean score of the Symptom Severity Scale (SSS) and Functional Status Scale (FSS) of the Boston carpal tunnel questionnaire, subjective improvement and proportion of participants

with recurrences during the follow-up period of 12 months. At short-term assessment the TCA-group (n = 36) had improved more than the NaCl-group (n = 33) for outcomes treatment response with a number to treat of 3 (95% CI:1.83, 9.72), mean improvement of SSS score (0.29 vs. 0.92; $p<0.05$) and FSS score (-0.01 vs. 0.58; $p<0.05$) and perceived improvement ($p=0.01$). 49% of TCA-responders (17/35) had recurrences during follow-up. In the group of TCA-responders without recurrences (51%, 18/35) outcomes for SSS-score and FSS-score deteriorated during the follow-up period of 12 months (resp. $p=0.008$ and $p=0.012$). We therefore could conclude that corticosteroid injections for CTS provided by general practitioners are effective regarding short term outcomes when compared to placebo injections. The short term beneficial treatment effects of steroid injections deteriorated during the follow-up period of twelve months and half of the cohort of steroid-responders had recurrences.

The results of the RCT assessing efficacy of steroid injections for trigger finger were described in **Chapter 5**. The objective was to study efficacy and safety of corticosteroid injections for trigger finger (flexor tenosynovitis) in adults in general practice. 50 adult patients presenting with a clinical diagnosis of trigger finger were recruited from the practices of 21 participating general practitioners in the northern part of the Netherlands. Short-term outcomes (two weeks after injection treatment) were assessed in a randomized, placebo-controlled trial. Long-term outcomes were assessed in a prospective cohort-study of steroid responders during the follow-up period of 12 months. Participants were randomized to injections of 1 ml triamcinolonacetonide 10 mg/ml (TCA) or 1 ml NaCl (placebo). Participants who had been treated with NaCl and who had no treatment response at short term assessment were treated with 1 or 2 additional open TCA injections. Primary outcomes were improvement of symptoms as perceived by the patient, improvement in symptoms not warranting further treatment (based on consensus agreement between patient and treating physician), reduction in the frequency of triggering, reduction of pain in the palm of the hand at the site of the affected finger and improvement in functional status as assessed by sub-items hand and finger function of the Dutch version of the Arthritis Impact Measurement Scale 2 (AIMS-2). Secondary outcomes were side-effects of steroid injection and patient satisfaction. The TCA group did significantly better for all outcomes than the placebo treated group at short-term assessment. The short-term treatment effects were maintained in the group of steroid responders (n = 32) during follow-up period of 12 months. There were only a few minor side-effects of corticosteroid treatment. We concluded that one or two local injections of 1 ml triamcinolonacetonide 10 mg/ml is an effective method of treatment for trigger fingers in general practice when compared to placebo injection. The beneficial effects of steroid injections lasted up to 12 months.

Chapter 6 contains the report of the RCT of efficacy of steroid injections for de Quervain's tenosynovitis. In this study effectiveness of local corticosteroid injections for de Quervain's tenosynovitis provided by general practitioners was assessed. Participants with de Quervain's tenosynovitis were recruited by general practitioners. Participants were randomized to one or two local injections of 1 ml of triamcinolonacetonide (TCA) or 1 ml of NaCl 0.9% (placebo). Non-responders to NaCl were treated with additional open TCA injections. Main outcomes were immediate treatment response, severity of pain, improvement as perceived by participant, functional disability using sub items hand and finger function of the Dutch Arthritis Impact Measurement Scale (Dutch AIMS-2-HFF) and these were

measured one week after intervention and during the follow-up period of 12 months. Short-term outcomes (two weeks after injection treatment) were assessed in a randomized, placebo-controlled trial. Long-term assessment took place during the 12 month follow-up period in an open prospective cohort-study of steroid responders. 21 wrists in 21 patients were included by 11 general practitioners. The TCA-group had better results for short-term outcomes treatment response (78 % versus 25%; p=0.015), perceived improvement (78% versus 33%; p=0.047) and severity of pain (4.27 versus 1.33; p= 0.031) but not for the Dutch-AIMS-HFF (2.71 versus 1.92; p=0.112). Absolute risk reduction for the main outcome short-term treatment response was 0.55 (95% CI: 0.34, 0.76) with a number needed to treat of 2 (95% CI: 1, 3). In the cohort of steroid responders (n=12) the beneficial effects of steroid injections were sustained during the follow-up of 12 months regarding the severity of pain and scores of Dutch AIMS-2-HFF, but not for patient perceived improvement. No adverse events were observed during the 12 months of follow-up. Although the number of participants recruited was small, it was concluded that one or two local injections of 1 ml triamcinolonacetonide 10 mg/ml provided by general practitioners leads in the short term to symptomatic improvement in participants with de Quervain's tenosynovitis when compared to placebo injections. The short term beneficial effects of steroid injections for symptoms were maintained during the follow-up after 12 months.

In **Chapter 7** the validation study for our Dutch translation of the Boston Carpal Tunnel Questionnaire (BCTQ) is described. The BCTQ is a validated instrument for assessing symptom severity and functional status in carpal tunnel syndrome. We translated the BCTQ into Dutch and investigated the psychometric properties internal consistency, responsiveness and floor and ceiling effects, using data from the HAWITT-trial(Chapter 4). Internal consistency was demonstrated by a Cronbach's alpha of 0.86 (95% CI: 0.81-0.91) for the symptom subscale and 0.92 (95% CI: 0.88-0.94) for the functional subscale. Responsiveness was assessed by calculating the standard error of measurement (SEM) which was 3.15 and minimal important change (MIC) which was 0.29 for the symptom subscale and respectively 2.34 and 0.29 for the functional subscale of the BCTQ.
The area under the curve of the receiver operating curve was 0.80 (95% CI: 0.67-0.92) for the symptom subscale and 0.70 (95% CI: 0.56-0.83) for the functional subscale using the outcome treatment response as reference standard. This means that the Dutch BCTQ adequately discriminates between participants who have responded sufficiently (based on consensus between patient and physician) to treatment and those who have not.
Minimal Important Clinical Difference (MCID) ranged from 0.50 to 0.68 for the symptom subscale of the BCTQ and from 0.05 to 0.31 for the functional subscale of the BCTQ, indicating that a change score for the Dutch BCTQ ranging from 0.50 to 0.68 is clinically relevant for the symptom subscale and a change score ranging from 0.05 to 0.31 is clinically relevant for the functional subscale. No significant floor or ceiling effects were observed. We concluded that our Dutch translation of the Boston Carpal Tunnel Questionnaire has appropriate internal consistency, is responsive and showed no floor or ceiling effects.

In **Chapter 8**, the general discussion, the main findings of the studies reported in this thesis are summarized (two systematic reviews, three RCT's and a validation study). This chapter also reflects on possible implications of the findings of this thesis for the

practicing general practitioner regarding treatment of CTS, trigger finger and de Quervain's tenosynovitis. Strengths and limitations of this thesis are discussed and finally recommendations for future research are made.